

		Medium:		Soil Gas on Southern Parcels	
		Investigation Phase:		Phase 1	Phase 2
		Investigation Item:		Investigation of Soil/Fill on Southern Parcels	Soil Gas Probe Investigation based on Southern Parcels Soil/Fill investigation (if necessary)
DQO Step:	1 <u>State the Problem</u>				
	i) Problem description		- The fill areas have not been fully characterized, and they may contain materials that can produce elevated concentrations of explosive gases and NMOcs in landfill gas, and VOCs in soil gas. - Businesses operating on Site are located above or immediately adjacent to fill material, in close proximity to the soil gas probe locations where elevated levels of VOCs and explosive gases were detected. - A data gap exists with respect to possible groundwater contamination outside of OU1 that may have concentrations capable of posing a vapor intrusion threat. - A data gap exists with respect to potential soil contamination that may pose a vapor intrusion threat to businesses operating on or near the southern parcels.		- If soil and/or fill borehole samples containing contaminant concentrations with the potential to produce landfill gas/soil vapor are identified, actual soil gas concentrations will be investigated through the installation of soil gas probes in the affected area to assess the present conditions and potential for migration.
	ii) Planning team		See note at bottom		
	iii) Conceptual model		- VOCs, such as TCE, may volatilize from groundwater into vadose zone soil gas, which may migrate to indoor air via foundation cracks and utility penetrations in buildings. - Workers or residents in buildings where VOCs are present at concentrations greater than target criteria may be subject to potential risks due to inhalation hazards. -Potential future users of the Site include workers and residents in buildings on areas of the site that are currently vacant.		
	iv) General intended use for data		-The collected soil/fill and groundwater data will be used to evaluate the potential for soil/fill contamination to act as a source for landfill gas/soil vapor, and to identify areas with potential landfill gas/soil vapor impacts.		The collected soil gas data will be used for direct comparison to the action levels, and each result will represent a reasonable worst-case maximum potential concentration migrating to indoor air at each structure. The data collected will ultimately be used in the Baseline Risk Assessment for OU2.
	v) Resources, constraints, deadlines		An iterative sampling approach may be required to refine estimates based on earlier findings from the OU1 vapor intrusion investigation.		Sufficient resources have been reserved to collect and analyze soil gas from the probes. Sampling may be constrained by access agreements to off-Site parcels or buildings. An iterative sampling approach may be required to refine estimates based on findings from the soil/fill investigation.
2	<u>Goals of the Study:</u>				

i) Primary study question	<div>- Do contaminant concentrations in soil vapor pose an unacceptable risk, via the vapor intrusion pathway, to occupants of structures on, or immediately adjacent to the Site?</div> <div>- Are concentrations of combustible gases within a structure greater than the screening criterion of 1 and 10 percent of the LEL (as per the USEPA Region V Vapor Intrusion Guidebook, October 2010), or the regulatory criterion of 25 percent of the LEL (as per OAC Chapter 3745-27-12)?</div> <div>- Taken together, how do the concentrations of contaminants and combustible gases in soil vapor affect future use of the Site?</div> <div>- Does the OU2 soil vapor act as a source of soil gas to the structures studied in the Vapor Intrusion investigation?</div>	
ii) Alternate outcomes or actions	<div>- If soil/fill borehole samples and/or groundwater samples contain VOCs at concentrations less than the action levels, and methane below 1 and 10 percent of the LEL, no further action is necessary.</div> <div>- If VOCs and/or methane are present at concentrations greater than the action levels, then further evaluation is required.</div>	<div>- If soil gas samples contain VOCs at concentrations less than the action levels, and methane below 1 and 10 percent of the LEL, no further action is necessary.</div> <div>- If VOCs and/or methane are present at concentrations greater than the action levels, then further evaluation is required.</div>
iii) Type of problem (decision or estimation) ⁽²⁾	Decision (Action Level)	Decision (Action Level)
iv.a) Decision statement	Determine whether VOCs are present in soil/fill material and groundwater along the southern and western perimeters of the Quarry Pond Parcels at levels posing potential risk to occupants of on-Site structures specified in the Vapor Intrusion Investigation Work Plan (CRA, December 17, 2010). ⁽¹⁾	Determine whether VOCs are present in the fill material and along the southern and western perimeters of the Quarry Pond Parcels at levels posing potential risk to occupants of off-Site structures identified as being at risk from volatilization of groundwater into indoor air based on Phase 2 of the Groundwater DQO investigation and Southern Parcels soil investigation.
iv.b) Estimation statement & assumptions	--	--

3 Identify Information Inputs:

i) Information types needed	- Analytical data from soil boreholes installed within the soil and fill material, and groundwater samples.	- This would be a new data collection effort, with analyses performed on samples collected from soil gas probes installed within the soil and/or fill material.
ii) Information sources	- New data from the Southern Parcels soil investigation will form the basis of assessment.	- New data from the Southern Parcels soil vapor/landfill gas investigation will form the basis of assessment.
iii) Basis of Action Level	Action Levels are: <div>- Ohio Department of Health (ODH) Industrial Action Levels</div> <div>-USEPA Vapor intrusion screening levels (VISLs: soil, groundwater, and sub-slab air levels calculated from USEPA RSLs for air inhalation).</div>	
iv) Appropriate sampling & analysis methods	Methods are described in the Field Sampling Plan (CRA, January 2011) and the Quality Assurance Project Plan (CRA, September 2008).	Methods are described in the Vapor Intrusion Investigation Work Plan (CRA, December 17, 2010) and Field Sampling Plan (CRA, January 2011). <div>VOC and naphthalene analysis is via EPA method TO-15.</div>

During the soil borehole investigation, Methane values will be recorded in the field using an RKI Eagle 2 equipped with a methane elimination mode to differentiate methane from VOCs.	During soil gas probe installation, methane values will be recorded in the field using an FID or combustible gas meter. To confirm the field readings, a percentage of the Summa Canisters will be analyzed for methane via ASTM D1946.
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4 **Define the Boundaries of the Study:**

i) Target population, sample units	The target population is surficial and subsurface soils and fill, and groundwater on the Southern Parcels (and beyond the southern parcels, if necessary). The sampling units are individual samples collected from the soil, divided into background reference, and exposure units for assessment of risks to human receptors.	Target population is soil gas within the soils and/or the fill area where concentrations of VOCs in soil, fill, and/or groundwater are greater than Phase 1 action levels, and therefore, represent a vapor intrusion risk.
ii) Specify spatial boundaries	Spatial boundaries are initially the limits of the Southern Parcels within the OU2 boundary, which included the fill area and occupied buildings.	Spatial boundaries are (initially) the limits of the Southern Parcels within the OU2 boundary, which includes the fill area and occupied buildings, where concentrations of contaminants in soil, fill or groundwater are greater than Phase 1 Action Levels. If soil vapor/landfill gas migration beyond the southern parcels is indicated by either Phase 1 or Phase 2 sampling, additional soil probes outside of the southern parcels will be necessary.
iii) Specify temporal boundaries	The temporal boundaries are indefinite, assuming continued exposure at levels found during sampling. The practical temporal limits are based on exposure assumptions used in the derivation of the Action Levels.	
iv) Identify any other practical constraints	- Practical constraints anticipated for sampling of Southern Parcel soil include the presence of cars on the Jim City Parcels and buildings and equipment on the Ron Barnett Parcels. - Safety issues associated with sampling adjacent to surface water will also be considered for sampling activities on the Quarry Pond Parcels.	- Practical constraints anticipated for sampling of Southern Parcel soil gas include the presence of cars on the Jim City Parcels and buildings and equipment on the Ron Barnett Parcels. - Safety issues associated with sampling adjacent to surface water will also be considered for sampling activities on the Quarry Pond Parcels. - Depending on soil borehole sample analytical results, the soil gas probe may not be able to be screened in intervals that delineate the specific stratigraphic layer(s) contributing to combustible gas concentrations.
v.a) Scale of inference for decision making	The decision unit is the fill area within the Southern Parcels.	
v.b) Scale of estimates	--	